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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
NG, CHRISTINE Y	

ART UNIT	PAPER NUMBER
2663	

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/809,562	HENDLER, HILLEL	
	Examiner	**Art Unit**	
	Christine Ng	2663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 24 January 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-5,7-20,22-25 and 27-29 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 18 and 19 is/are allowed.

6)☒ Claim(s) 1-5,7-17,20,22-25 and 27-29 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 14 March 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The indicated allowability of claims 6 and 7 is withdrawn in view of the newly discovered reference(s) to U.S. Patent No. 5,418,452 to Pyle. Rejections based on the newly cited reference(s) follow.

3. Claims 1, 2, 4, 7 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,418,452 to Pyle.

Referring to claim 1, Scott discloses in Figure 2 a communication method comprising the steps:

Receiving (at antennas 130,131) multiple signals (antenna signals 140,141). Refer to Column 3, lines 51-55.

Multiplexing (at summer 151) the signals (antenna signals 140,141). Refer to Column 4, lines 34-35.

Transporting the multiplexed signals through a single chain (backhaul cable 152). Refer to Column 4, lines 35-37.

Demultiplexing (at splitter 160) the signals (antenna signals 140,141). Refer to Column 4, lines 50-52.

Using each of demultiplexed signals (antenna signals 166,167) in a related application (antenna diversity). Refer to Column 4, line 66 to Column 5, line 12 and Column 8, line 32 to Column 9, line 10.

[*Previously claim 6*] Scott does not disclose that said step of multiplexing comprises multiplexing the multiple signals at a sampling rate greater than n*Fs, where n is the number of signals and Fs is a Nyquist sampling rate for a single signal.

Pyle discloses in Figure 1 a multiplexer 18 that multiplexes 8 signals 16A-16H. The clock signal on line 30 must satisfy the Nyquist sampling criterion for sampling. Specifically, the frequency of the clock signal on line 30 must be at least 16 times as high as the transition rate for the fastest input line 16, since MUX 18 has 8 inputs and each signal must be sampled at least twice as fast as its transition rate. Refer to Column 2, lines 24-41 and Column 4, lines 37-52. Pyle also discloses another example in Figure 4 of MUXes 50 and 56. The fastest signal input into MUX 50 has a frequency of 1 kHz, so the sampling signal on clock input 56 must have a frequency of at least 16 kHz. The fastest signal input into MUX 45 has a frequency of 2 kHz, so the sampling signal on clock input 46 must have a frequency of at least 32 kHz. Refer to Column 5, line 44 to Column 6, line 5. In all of these cases, the MUX samples the signals at n*Fs, where Fs is the Nyquist sampling rate of the fastest signal and n is the number of signals (8). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include said step of multiplexing comprises multiplexing the multiple signals at a sampling rate greater than n*Fs, where n is the number of signals and Fs is a Nyquist sampling rate for a single signal; the motivation

being that sampling at the Nyquist sampling rate avoids the problem of aliasing and interference between samples and ensures that all signals are sampled often enough. Refer to Column 4, lines 45-52. Furthermore, since the MUX multiplexes n signals and each signal must be sampled at the Nyquist sampling rate, the total output of the MUX is n multiplied by the Nyquist sampling rate.

Referring to claim 2, Scott discloses in Figure 2 that the step of receiving comprises receiving each of the multiple signals (antenna signals 140,141) on a separate antenna (antennas 130,131). Refer to Column 3, lines 51-55.

Referring to claim 4, Scott discloses in Figure 2 that the multiple signals (antenna signals 140,141) are RF signals. Refer to Column 3, lines 33-36.

Referring to claim 7, Scott does not disclose that Fs is the Nyquist sampling rate of a highest bandwidth of the multiple signals.

Pyle discloses in Figures 1 and 4 that the MUXes are controlled by clock signals to sample the n signals at n*Fs, where Fs is the frequency of the fastest signal. The fastest signal has the greatest bandwidth. Refer to the rejection of claim 1. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that Fs is the Nyquist sampling rate of a highest bandwidth of the multiple signals; the motivation being since the fastest signal occupies the largest bandwidth, a Nyquist sampling rate of the fastest signal will also be the Nyquist sampling rate for all other slower signals, thereby fulfilling the Nyquist criterion.

Referring to claim 10, Scott discloses in Figure 2 that the step of using comprises using the demultiplexed signals (antenna signals 166,167) in an antenna diversity application. Refer to Column 8, line 32 to Column 9, line 10.

Referring to claim 11, Scott discloses in Figure 2 that:

The method further comprises a step of downconverting the multiplexed signals (antenna signals 130,131) to a baseband signal. Refer to Column 4, lines 37-49.

The step of demultiplexing (at splitter 160) comprises demultiplexing the downconverted baseband signal. Refer to Column 4, lines 50-52.

The step of using comprises using the demultiplexed signals (antenna signals 166,167) in an antenna diversity application. Refer to Column 8, line 32 to Column 9, line 10.

Referring to claim 12, Scott discloses in Figure 2 that the step of using comprises using the demultiplexed signals (antenna signals 166,167) in separate applications. The antenna providing the stronger signal may be used for communication until the signal quality deteriorates. Refer to Column 8, line 32 to Column 9, line 10.

Referring to claim 13, Scott discloses in Figure 2 that the step of transmitting the multiple signals (antenna signals 140,141) from separate sources. Refer to Column 3, lines 51-55.

Referring to claim 14, refer to the rejections of claims 11 and 12.

Referring to claim 15, refer to the rejection of claim 13.

4. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott U.S. Patent No. 5,418,452 to Pyle, and in further view of U.S Patent No. 6,411,824 to Eidson.

Referring to claim 3, Scott does not disclose multiplexing the multiple signals using an SPDT switch.

Eidson discloses in Figure 9 a combiner that performs antenna diversity, which comprises a SPDT switch 920. The combiner computes the amplitudes of the incoming signals from antennas 910 and 912 and then the comparator 918 selects the larger of the two amplitudes and directs the SPDT switch 920 to select the input corresponding to the largest amplitude. Refer to Column 15, lines 21-61. The SPDT switch allows each antenna 910 and 912 to be assigned a pole of the SPDT switch so that the SPDT switch can change from one antenna to another. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include multiplexing the multiple signals using an SPDT switch, the motivation being that a SPDT switch can be turned on in two positions which allows it to switch on a separate antenna when in a certain position, thereby allowing two antennas to be used alternatively depending on their signal quality.

Referring to claim 5, refer to the rejection of claims 2, 3 and 4.

5. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,418,452 to Pyle, and in view of U.S. Patent No. 6,701,141 to Lam.

Referring to claim 8, Scott does not disclose that the step of using comprises using the demultiplexed signals in a beam forming application.

Lam discloses in Figure 2 an IF beamformer that uses demultiplexed signals from an analog splitter 204 in a beam forming application, where each subarray 208 performs beam forming for its received signals by adjusting the phase of each of the received signals. Refer to Column 4, line 57 to Column 5, line 21. A beam forming network adjusts the phase or amplitude of received signals to form a desired beam towards a particular direction. Refer to Column 1, lines 12-20. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the step of using comprises using the demultiplexed signals in a beam forming application, the motivation being that beam forming prevents multi-path transmissions and allows coherent transmission and reception of signals by directing signals in a desired direction.

Referring to claim 9, refer to the rejection of claim 11 and claim 8.

6. The indicated allowability of claims 21 and 26 is withdrawn in view of the newly discovered reference(s) to U.S. Patent No. 5,198,992 to McCaslin. Rejections based on the newly cited reference(s) follow.

7. Claims 16, 17, 20, 22, 25 and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,198,992 to McCaslin.

Referring to claim 16, Scott discloses in Figure 2 a communication receiver comprising:

A switch (Figure 2) comprising:

At least two inputs, each input configured to coupleable to at least two signal carrying devices (antennas 130,131). Refer to Column 3, lines 51-55.

A switching mechanism (summer 151) configured to multiplex signals (antenna signals 140,141) received at said inputs. Refer to Column 4, lines 34-35.

An output (backhaul cable 152) configured to carry the multiplexed signal (from summer 151). Refer to Column 4, lines 35-37.

A downconverter (not shown) comprising an input coupled to the output of the switch (summer 151) and configured to downconvert the multiplexed signal (from summer 151). Refer to Column 4, lines 37-49.

A signal processor (splitter 160) comprising an input coupled to receive the downconverted multiplexed signal (from summer 151) and an output (demultiplexed signals 166,167). Refer to Column 4, lines 50-61.

Wherein the signal processor (splitter 160) is configured to provide, at the signal processor (splitter 160) output, a data signal (demultiplexed signals 166,167) substantially corresponding to data contained in a communication signal carried by the signal carrying devices (antennas 130,131). Refer to Column 4, lines 50-61.

[*Previously claim 21*] Scott does not disclose that the switch operates at a frequency which is substantially equal to at least twice a Nyquist required sampling rate for a bandwidth of the communication channel.

McCaslin et al disclose in Figure 1 a processing system that receives a baseband analog signal from an antenna 21. The signal goes through an analog-to-

digital converter 24, which samples the received signal at twice the Nyquist rate (four times the highest expected frequency component). Refer to Column 2, lines 29-53. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the switch operates at a frequency which is substantially equal to at least twice a Nyquist required sampling rate for a bandwidth of the communication channel; the motivation being that sampling at two times the Nyquist sampling rate can attenuate the effects of aliasing and harmonics.

Referring to claim 17, Scott discloses in Figure 2 that the communication receiver (Figure 2) is a wireless communication receiver and the signal carrying deices are antennas (antennas 130,131). Refer to Column 3, lines 33-36 and lines 51-59.

Referring to claim 20, Scott discloses in Figure 2 the communication receiver, wherein:

The communication signal (RF signal 113) comprises a plurality of communication signals (to each antenna 130,131). Refer to Column 3, lines 33-36.

Each antenna (antennas 130,131) of the at least two antennas (antennas 130,131) is configured to receive one of the plurality of communication signals. Refer to Column 3, lines 51-55.

The signal processor (splitter 160) comprises at least two demodulators (filter/correlator 170,172 and 171,173) each configured to receive one of the at least two digital signals each corresponding to a digital representation of a portion of a communication signal (RF signal 113) of the plurality of communication signals received

by one of the at least two antennas (antennas 130,131). Refer to Column 4, line 66 to Column 5, line 12 and Column 8, lines 55-59.

Each of the at least two demodulators (filter/correlator 170,172 and 171,173) are configured to provide a data signal corresponding to a signal substantially corresponding to data contained in the communication signal (RF signal 113) of the plurality of communication signals. Refer to Column 4, line 66 to Column 5, line 12.

Referring to claim 22, Scott discloses in Figure 2 a method for receiving a communication signal (RF signal 113) a wireless communication device comprising least two antennas (antennas 130,131), comprising:

Receiving a communication signal (RF signal 113) using least two antennas (antennas 130,131). Refer to Column 3, lines 51-55.

Sampling the communication signal (RF signal) from each of the least two antennas (antennas 130,131) to produce a sampled signal. The signal may be periodically sampled using A/D sampling before transmission over backhaul cable 152. Refer to Column 13, lines 42-50.

Down converting the signal (RF signal 113) to generate a down converted signal. Refer to Column 4, lines 37-49.

Generating a digitized signal from the down converted signal. The signal may be periodically sampled using A/D sampling before transmission over backhaul cable 152. Refer to Column 13, lines 42-50.

De-multiplexing (splitter 160) the digitized signal produce least two digital signals

(antenna signals 166,167) each corresponding communication signal as received by the at least two antennas (antennas 130,131). Refer to Column 4, lines 50-52.

Preparing (using antenna diversity) an output signal based on the at least two digital signals (antenna signals 166,167). Refer to Column 4, line 66 to Column 5, line 12.

[*Previously claim 26*] Scott does not disclose the step of sampling comprises sampling at a frequency substantially equal to at least twice a Nyquist required sampling rate for a bandwidth of the communication signal. Refer to the rejection of claim 21.

Referring to claim 25, Scott discloses that the method further comprises the step of demodulating each of the at least two digital signals (antenna signals 140,141). Refer to Column 9, lines 3-5.

The step of preparing comprises combining the demodulated signals (antenna signals 140,141) as the output signal (using combining diversity). Refer to Column 9, lines 1-10.

Referring to claims 27-29, Scott does not specifically disclose that the method is embodied in a set of computer instructions stored on a computer readable media and that the computer instructions, when loaded into a computer, cause the computer to perform the steps of the method; that the computer instructions are compiled computer instructions stored as an executable program on the computer readable media; nor that the method is embodied in a set of computer readable instructions stored in an electronic signal.

However, Scott discloses in Figure 2 that each of the hardware components of

the receiver system, which reads on computer readable media, are programmed to perform the steps of claim 22. Furthermore, the base station 164, which also reads on computer readable media, must also be programmed to be able to determine the quality of the received signals to determine which signal to use according to a certain antenna diversity method. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the method is embodied in a set of computer instructions stored on a computer readable media and that the computer instructions, when loaded into a computer, cause the computer to perform the steps of the method; that the computer instructions are compiled computer instructions stored as an executable program on the computer readable media; and that the method is embodied in a set of computer readable instructions stored in an electronic signal. One would have been motivated to do so in order to store a predetermined and programmed routine for the system to perform antenna diversity.

8. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,859,842 to Scott in view of U.S. Patent No. 5,198,992 to McCaslin, and in further view of U.S. Patent No. 6,701,141 to Lam.

Referring to claim 23, refer to the rejection of claim 8. Furthermore, Scott discloses the use of selection diversity, in which one of the at least two signals is selected as the data output signal. Refer to Column 8, lines 43-67.

Referring to claim 24, refer to the rejection of claim 8. Furthermore, Scott discloses that the method for receiving includes the steps of:

Determining an error (measure of signal quality) of each of the at least two digital signals (antenna signals 166,167). Refer to Column 8, lines 43-67.

Selecting one of the at least two digital signals (antenna signals 166,167) as the data output signal based upon an error criteria (measure of signal quality). Refer to Column 8, lines 43-66.

Allowable Subject Matter

9. Claims 18 and 19 are allowed.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Ng whose telephone number is (571) 272-3124. The examiner can normally be reached on M-F; 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Ng CN
June 9, 2005

RICKY NGO
PRIMARY EXAMINER
6/12/05